A Vision For the Gigabit Future

Excerpts from the keynote address given at the 2013 ***Broadband Communities Summit*** *by Milo Medin, vice president of access services for Google*

Milo Medin, Google's vice president for access, giving the keynote address at the 2013 **Broadband Communities** Summit.

As we look forward to deployment in Austin and other cities, one of the questions I get is, "Why is Google doing this, anyway?" What is so broken that it would prompt a company like ours to leave our traditional role in the Internet economy and get into the access business and even the TV business?

At Google, we really care about speed. It's not just because speed makes it nicer for you to browse the Web and more pleasurable to read your email. It's because speed empowers you to consume a lot more information in the same amount of time and do things that would be impossible or impractical without it.

Watching a Khan Academy tutorial on YouTube just wouldn't be practical on a slow network. Google Maps would be so sluggish that you would pull out your old traditional map instead. Uploading photos would be so slow that you'd just print them out and mail them instead.

It wasn't that long ago that networks were like that in the U.S. None of these now-common experiences would exist if we had not made the leap to broadband and speeds that were about 100 times faster than the dial-up network it replaced.

We have whole teams of engineers at Google who spend their days working hard to make the Web go faster – a millisecond here, a millisecond there. Speed is part of how we differentiate ourselves because every day our users make a choice. They choose to use us for search, they choose to use us for maps, they choose to use us for mail, and the competition is just a click away. We have to provide a better experience every day, or we'll lose our users. We invest billions of dollars on infrastructure and talent to keep innovating. It's a way of life for us.

NETWORKS ARE CONSTRAINED

Increasingly we've begun to see that we're more and more constrained by the networks users use to get to our services and other people's services throughout the Internet as well. Not everywhere but certainly in the U.S., this is increasingly a problem.

The statistics back this up: According to the latest OECD data, the U.S. ranks 16th in terms of average advertised speed. We do excel in another category – we pay some of the highest prices per Mbps in the world. We used to be a leader, and now I think we're in a state of blissful mediocrity. Speed matters to Google and to our users as well. I've never met anyone who said their Internet connection was too fast.

When Google solicited cities to work with us to deploy a gigabit

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network, 1,100 cities responded. These cities saw the need for faster access and the opportunity it could bring to their residents, their businesses, their schools and other institutions, and these cities saw the potential even before many of us at Google did. No one at Google expected a response like that. And that prompted us to ask whether there was an opportunity here.

AN OUTPOURING OF EXCITEMENT

The cities, time and time again, have told us how unifying an experience it was to put those proposals together, even after we announced that we had picked Kansas City for our first deployment. I got letters from city officials across the country thanking us for running this process because it was one of the few things they [had done in which] everybody joyfully collaborated. It's really quite remarkable. In some of the most divisive political times in our country, this initiative was something that literally everybody agreed with, and I personally find that quite amazing.

We certainly saw this sort of response in Kansas City when we announced that we were building there and ran our sign-up process. Last week, in Austin, we saw a similar outpouring of excitement. Within 24 hours, we saw tens of thousands of Austinites go to our info page and sign up, not just for news but to give us information to help them be volunteers in mobilizing their neighborhoods for fiber.

It's amazing. I don't know about other cities, but there certainly seems to be plenty of demand in Kansas City and Austin. We're working hard to fulfill that demand.

GIGABIT SPEEDS AS THE NORM

What does Google want to see happen? We don't want to settle for an incrementally faster set of connections to people's homes and

We don't want gigabit to be something just a few people are willing to pay for at a highest tier but as the baseline speed for everybody – and without volume caps.

businesses. What we want to see is a step function increase in speed, coupled with affordable pricing, so that gigabit speeds become the norm.

We don't want gigabit to be something that just a few people are willing to pay for at a highest tier but as the baseline speed for everybody – and without the volume caps that strangle demand and don't address the issue of network congestion anyway. That step function happened in the late '90s, when my first company partnered with cable operators to deliver affordable broadband at a time when the standard product was a hundred times faster than dial-up.

The only way to make that sort of product real is with fiber. Copper won't do it, and neither will HFC, at least not if symmetric gigabit as your baseline product is the goal.

Of course, you can use fiber to deliver traditional speeds as well, and you can compete with cable and others reasonably well doing so, but this isn't moving the Web forward to a new place. It doesn't remove speed as a barrier to innovation the way a 100x speed-up can. And it's hard to get users excited about a me-too product.

Part of the reason we've chosen places like Kansas City and Austin to build is [that] all these cities have a strong entrepreneurial and innovation bent. We think equipping them with a platform like this will generate all sorts of new services and applications, just [as] the last 100x jump in speed enabled Netflix, YouTube, Skype, Google Drive, etc.

MAKING THE ECONOMICS WORK

Because we saw no incentives for incumbents to build this sort of network and cannibalize their own products, we decided not just to complain about it but to take action and see if we couldn't build it ourselves. Of course, we have another goal as well. My boss, CFO Patrick Pichette, says, "This is not a hobby." For many operators today, broadband service is "ridiculously profitable," as my friend Craig Moffett, a Wall Street analyst, would say. The cost of moving bits around keeps getting lower and lower because of technology driving improvements in capacity, and we think there is a good business here.

There are a few elements to making this work. One is working collaboratively with communities to drive down the cost of deployment. This is something communities should do anyway because even if they don't care about bringing Google Fiber to their cities, process improvements and cost reduction are important to any new entrant, and new choices are good for consumers and businesses. When cities take action to streamline processes and lower the cost for new providers to build, everyone benefits.

Another key component in making the economics work is building to demand. Instead of trying to decide where to build and then marketing to the community afterward and adding users one at a time, we let the citizens tell us where demand is in the neighborhood. Then we build the distribution network accordingly and hook everybody up in one big wave. This is a much more market-based approach and helps us ensure that capex is expended where demand exists – and connecting everyone in the neighborhood in one big wave drives the cost down again.

CONNECTING THE ENTIRE COMMUNITY

We also really care about seeing the entire community be connected. That's why we provide a basic free 5 Mbps service to anyone installed in that first wave if they pay a connection fee, and in Kansas City that's $300. The cost of providing 5 Mbps of transport is really tiny, and all these homes can upgrade to a gigabit later without our having to roll a truck and install additional drives. That's also a part of the reason we connect a number of public institutions that the city chooses, [such as] schools and libraries, at a gigabit for free. We want to enable them to have access at the same speeds people at home do, and we think this will empower new levels of creativity in the community.

At Google, we're challenged by senior leadership to build good businesses that do good at the same time. It's not always easy, particularly when constructing access networks. We think our approach helps move the ball forward toward the goal of getting everyone connected, but this is not something that we can do by ourselves. By working together with the community, we can make a difference and really advance the ball.

BUILDING A TV PRODUCT

Another important element is demand. Ultimately it takes a great product for people to be excited about it. Not just a gigabit data service but things that can show it off, too. That's why we built an innovative TV product and bundled in the Google Drive product with our gigabit systems. This has not been easy. We looked and ultimately concluded that there were really no good IPTV platforms available out there, at least not that would allow us to integrate the best quality TV [with] Internet content and [provide] the ability to help distribute a gigabit connection throughout the home. So we had to invent that, all the way from encoding our own video streams directly from programmer feeds to designing a hardware and writing the software that goes into the devices in the home.

The good news is that there was a lot of room for innovation here. And that adds real value for users – from recording eight simultaneous HD streams at once to client devices attached to TVs that act as Wi-Fi routers. It's a pretty nice product and one that we're improving all the time. We are a software company, after all, and we can bring that to the table as well as our large network infrastructure.

All our analysis showed that it was nearly impossible to build a service that had economically viable take rates without television, and that's a product area where we thought we could add a ton of value, not just for our users but for programmers, too. It's not just about traditional TV; it's about making over-the-top video work well, too. That's why we collocate CDNs [content delivery networks] from Netflix and YouTube and Akamai and others right in Kansas City, and we'll do that in Austin as well. This is a win-win for everyone because users get better streaming performance when they're only a couple of milliseconds away from the server, and we don't have to carry all those bits across the long-haul network, enabling that network to scale better.

We were one of the initial Netflix CDN sites to be deployed, and this is part of the reason Google Fiber is rated by Netflix as the top ISP in delivering Netflix streams to its users. A lot of our competitors refuse to connect these caches directly to their access networks. We don't think that's a good idea.

We've seen a lot of improvement from having those CDNs local, and our users enjoy a better experience that really takes advantage of the speed of their broadband connections.

WHY THERE'S NO VOICE PRODUCT

We don't provide voice service. As many here know, the regulatory requirements that are triggered when you do that are nontrivial, and dealing with those means my engineers would not be spending time in other areas where we think we can add a lot more value. But I think that the price of voice is on its way to zero.

Increasingly, voice is bundled with other services. Thirty percent or more of households in the U.S. are wireless-only now; they depend on cell phones for voice service and, with a decent broadband connection, people have the choice of dozens of voice providers that are all working to drive down prices. We don't think it makes sense to depend on voice revenue streams, even in the medium term, since we're building a business for the next decade, not the last one.

The FCC has even changed the focus of the Universal Service Fund from voice to broadband – and you know that when the FCC takes action, it must be obvious.

WIRELESS NEEDS FIBER, TOO

Some argue that fiber networks are not really needed because of wireless network growth. As an engineer, quite honestly, this kind of talk makes my brain hurt. Wireless network growth is driven by fiber. All those base stations that smartphones connect to are increasingly connected by fiber because, as speeds go up, fiber is required to carry that kind of traffic. Copper just won't do for modern wireless networks.

Cisco and others expect wireless data to grow by a factor of 50 in the next few years, and you're not going to be able to solve that kind of growth by throwing more spectrum at it. You're going to have to reduce the size of the cells, shrinking them, reducing the number of users that are being served by a given base station. And that means a lot more cell sites and a lot more fiber to feed those cell sites. In the limit, the future of mobile is going to look a lot like Wi-Fi: tons of small cell sites connected by a wireline network, connected by fiber – and that's just physics, folks.

So not only does your city's wired broadband future depend on fiber, but your city's mobile broadband future does as well. If there isn't enough fiber to connect all those smaller and smaller cell sites together, your residents are going to suffer with slower speeds as networks congest and new sites can't be constructed because the fiber doesn't go deep enough.

WHAT COMMUNITIES CAN DO

So far we've been really pleased by how things are going in Kansas City. We've seen a number of things happen that confirm demand for a product like this, and we've been surprised by its impact on the community, even in these early days – from the startup village that has sprung up in our first fiberhood to the mention of Google Fiber as part of the reason Fitch upgraded Kansas City, Mo.'s debt rating. Can you believe that?

We have been really surprised by this impact and have been emboldened to expand the service to a few other cities. We're really looking forward to deployments in Austin and beyond.

But, as I said, it's still early days. We're learning a lot, and we're making our process and products better and better. Our No. 1 challenge is meeting demand for the product and scaling up installations and builds. We've come a long way in the two years since Google leadership approved the program based on this model, and we started building the systems and the technology that are now rolled out in Kansas City.

It's also the case that more and more cities are catching the vision of what this sort of network could mean for them – whether they are college communities banding together as part of Gig.U or others looking at what's happening in Kansas City and wanting the same benefits for their communities. Across the U.S., a vision for a future – a gigabit future – is starting to take hold.

What can you do about it? Just wait for us or someone else to come in and solve all your problems? Maybe you can complain to Washington? Have the FCC figure out a way to get fiber built?

Part of the reason the U.S. is falling behind is that most cities haven't been intentional about their broadband infrastructure. Cities know they have to make sure the water system works and scales to support growth, the roads are maintained and built, garbage is collected properly. But often, they think broadband is something that the phone company or the cable company will take care of for them and they can ignore it, or that the FCC will

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make sure the appropriate incentives are put into place to drive competition and upgrades. Depending on those processes is how we got into the situation we're in today.

If there is one message I want cities to leave here with, it's that you need to start owning how you plan to improve broadband in your community. Don't wait to have us or someone else do it for you. You can take meaningful action starting today. There is no silver bullet. This is going to be a long-term process, but the sooner you start, the sooner things will begin to change. Things like installing conduit every time the ground is opened, working with utilities to clear space on poles, streamlining permitting and inspection and processes, making sure conduit is placed every time a new building is put up or a new development is built so those homes and business can be equipped with tomorrow's networks, not yesterday's, and working with states to eliminate barriers there.

Every city can do these things. Some may choose to deploy networks themselves, and others will want to partner more. There is no one solution that works for everyone. Do not assume the right thing is just going to happen. History has shown that it usually won't. Being intentional in making your community a lot easier for us or anyone else to come in and build new networks requires real leadership, but I suspect if you talk to the folks in Kansas City, they'll tell you it's been worth it.

And perhaps more importantly, don't be satisfied with mediocrity, and don't let your residents be satisfied with it either. Based on what we've seen so far, this is a topic everyone in your city can rally around. Demanding more and working diligently to lower the barriers for new networks to come to your city will bring new choices for business and residents.

Your community can have a gigabit future if you want it badly enough to work at making that future a reality. If you do, I'm pretty sure it'll be worth the effort, just [as] it was in Kansas City.

After all, that is what leadership is all about. ❖

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